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Influence of self-similar collisions on the Doppler broadening

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Abstract

A self-similar collision model for the motion of radiating particles in a perturbed gas is suggested. The influence of effects of self-similar collisions on the shape of a spectral line in the Doppler regime is considered in the framework of classical Fourier integral theory. In the limiting case when the self-similar character of collisions is not taken into account the self-similar collision model becomes identical to the Galatry diffusion model. The general formula for the distribution function of the radiating particles in the self-similar model and a new correlation function in the impact approximation are derived. It is shown that the self-similar collision mechanism in the Doppler regime leads to additional spectral line narrowing.

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